# MATHEMATICS 24

## Teacher Manual



CLASSROOM
ASSESSMENT
MATERIALS

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# *The Classroom Assessment Materials*

## *Background*

The Classroom Assessment Materials Project (CAMP) was launched in 1994 in response to Alberta Education's goal of establishing and effectively communicating clear learning outcomes and high standards for each area of learning. As well, the project is a response to teachers' ongoing requests for high-quality assessment materials to use in their classrooms. CAMP also addresses the need for a common understanding of provincial standards that is frequently expressed by parents, teachers, school administrators, and other public spokespeople.

Although Alberta teachers and Alberta Education developed the Classroom Assessment Materials for teachers to use in Alberta's schools, educators from other provinces and countries have indicated that these materials have considerable potential for their jurisdictions.

## *Development*

Alberta Education staff have worked closely with teachers from all over Alberta to design and develop the Classroom Assessment materials. A project advisory committee with representation from key education organizations, including the Alberta Teachers' Association, provided essential advice and direction for the overall shape and philosophy of the project. Teachers have contributed in numerous and invaluable ways. They have:

- selected resource material and data bases
- developed questions and activities
- validated materials
- offered their time and classrooms for field testing and pilot testing
- provided advice about administration and manageability
- served on revision committees
- provided advice regarding the articulation of expectations from grade to grade/course to course and across subjects
- written and revised scoring criteria
- selected examples of students' work and written commentaries about them
- confirmed that the standards represented and expressed in the final materials are appropriately demanding, faithful to *Program of Studies* expectations, and clearly expressed or illustrated.

Without the dedication and professionalism of Alberta teachers, this project would not have happened.

## *Purpose of the Classroom Assessment Materials*

The Classroom Assessment Materials are summative assessment packages. They are designed to be used by classroom teachers to assess students' achievement of the learning outcomes specified in the *Program of Studies* relative to clearly stated standards.

The assessment activities in the CAMP materials are designed to be administrated in a classroom setting at times that suit the needs of the teacher and her or his students. The materials are not suitable for any other assessment purpose (e.g., diagnostic assessment, pre-instruction assessment, evaluation of instructional practice, system-wide assessment, program evaluation, teacher evaluation), and therefore they may not be used for any purpose imposed by any authority external to the classroom.

## *Contents of Each Set of Classroom Assessment Materials*

Each set of Classroom Materials contains three "documents":

- a *Teacher Manual* with complete information about the assessment activities, their relation to the *Program of Studies*, the weighting of assessment components, statements of standards, and administration instructions including scoring criteria and details for calculating students' marks
- complete *Student Materials*—all of the information, tests, and booklets that students will need for each component
- *Examples of Students' Responses* that show actual student work in relationship to the scoring criteria, along with explanatory commentary

For each grade, subject, and/or course, there are several assessment components that work together to provide teachers and parents with a broadly based portrait of a student's achievement of the expectations for students learning at the end of that grade/course.

Each set of assessment materials includes a variety of activities—selected-response questions, short written-answer questions, extended writing activities, performance tasks such as lab experiments, problem-solving activities, and oral presentations. All activities are designed to interest students and to be of direct and practical use for teachers. All are directly related to learning outcomes from the *Program of Studies*.

## *Effective Use of the Classroom Assessment Materials*

Teachers may use the Classroom Assessment Materials whenever they want to find out about a student's performance in relation to set standards for the end of that grade/subject/course. The materials were developed with the following questions in mind:

- What knowledge, skills, and attitudes should a student have firmly in place before he or she moves to the next grade or course?
- How well should students completing the learning outcomes for a particular grade/subject/course do what is expected of them?
- What does acceptable work for a grade/subject/course look like?
- What does excellent work for a grade/subject/course look like?

Teachers may administer the components in whatever order suits their classroom assessment needs; however, the components are designed to be used together. Only the complete set of assessment activities will provide a portrait of how well a student has met the standards for that grade/subject/course. Teachers may photocopy the materials as their needs require.

# *Acknowledgements*

This project has come to be because of the remarkable cooperation of school jurisdictions, hundreds of teachers and principals, and thousands of students. From everyone on the project teams—thank you.

The project teams also wish to thank the following organizations without whose consultation and advice the project would not have progressed:

Alberta Teachers' Association
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Public Colleges and Technical Institutes of Alberta

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*CAMP Project Leaders*
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*CAMP Subject Coordinators*
**English Language Arts**     Elana Scraba
**Mathematics**              Hugh Sanders
**Science**                  Greg Hall, Greg Thomas, Bernie Galbraith
**Social Studies**           Doug Burns

# *Contents*
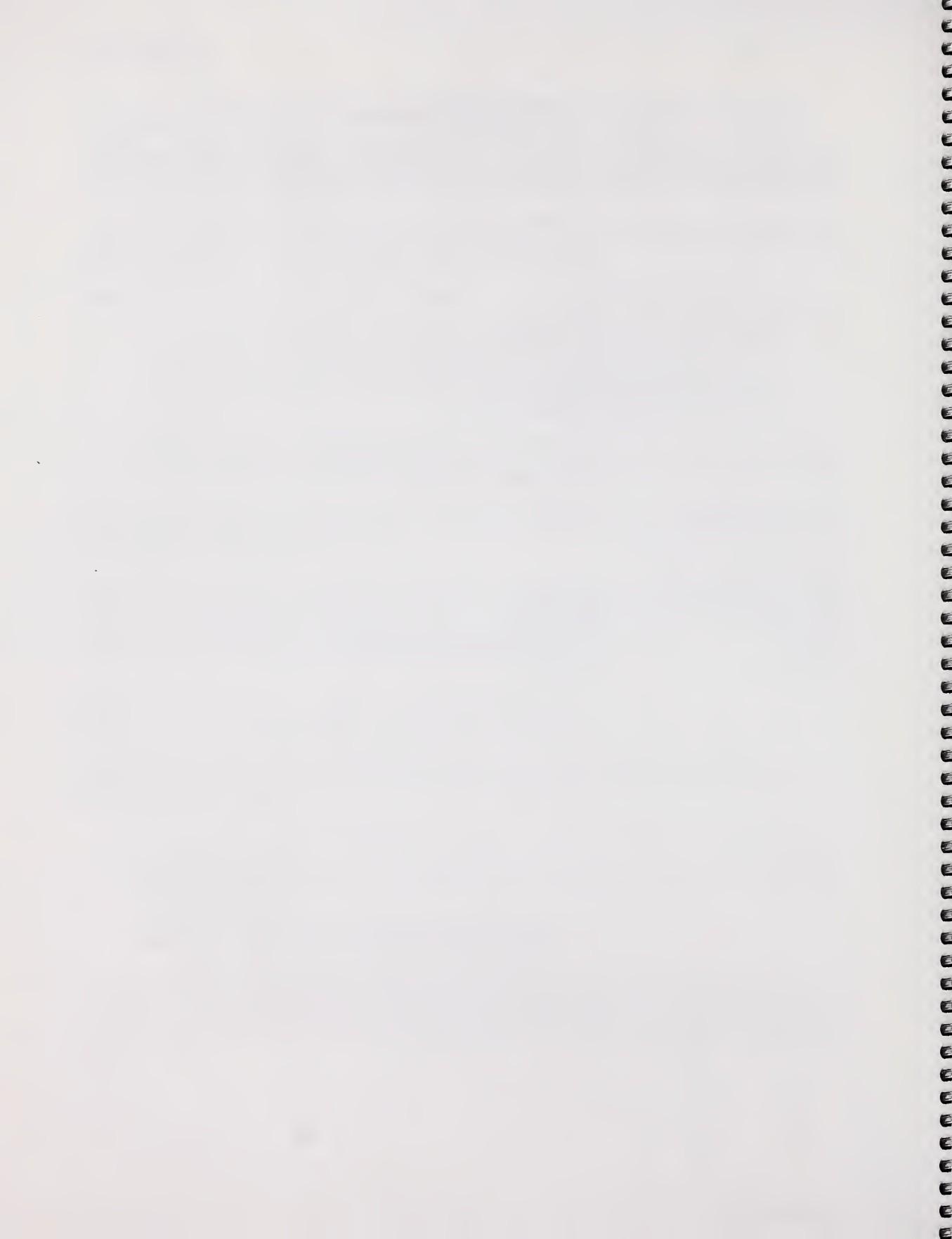
**In addition to this *Teacher Manual*, the Mathematics 24 Classroom Assessement Materials include a complete set of *Student Materials* and *Examples of Students' Responses*.**
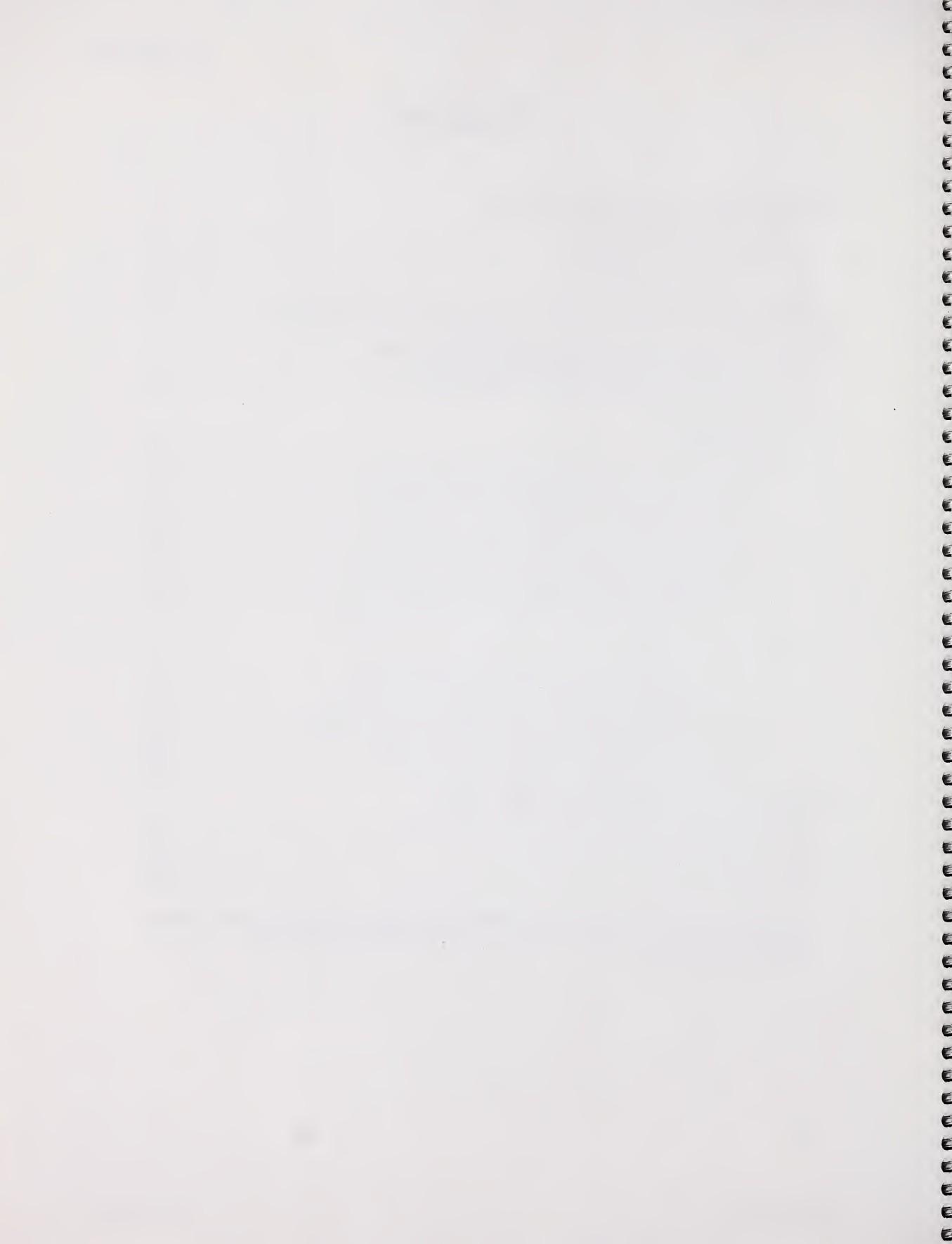
# *The Mathematics 24 Classroom Assessment*

- *Overview of the Assessment*
- *Components of the Assessment*
- *Definitions and Terminology*
- *Blueprint of the Assessment*
- *Description of Standards*
- *Relationship of Assessment Standards to General Learner Expectations*
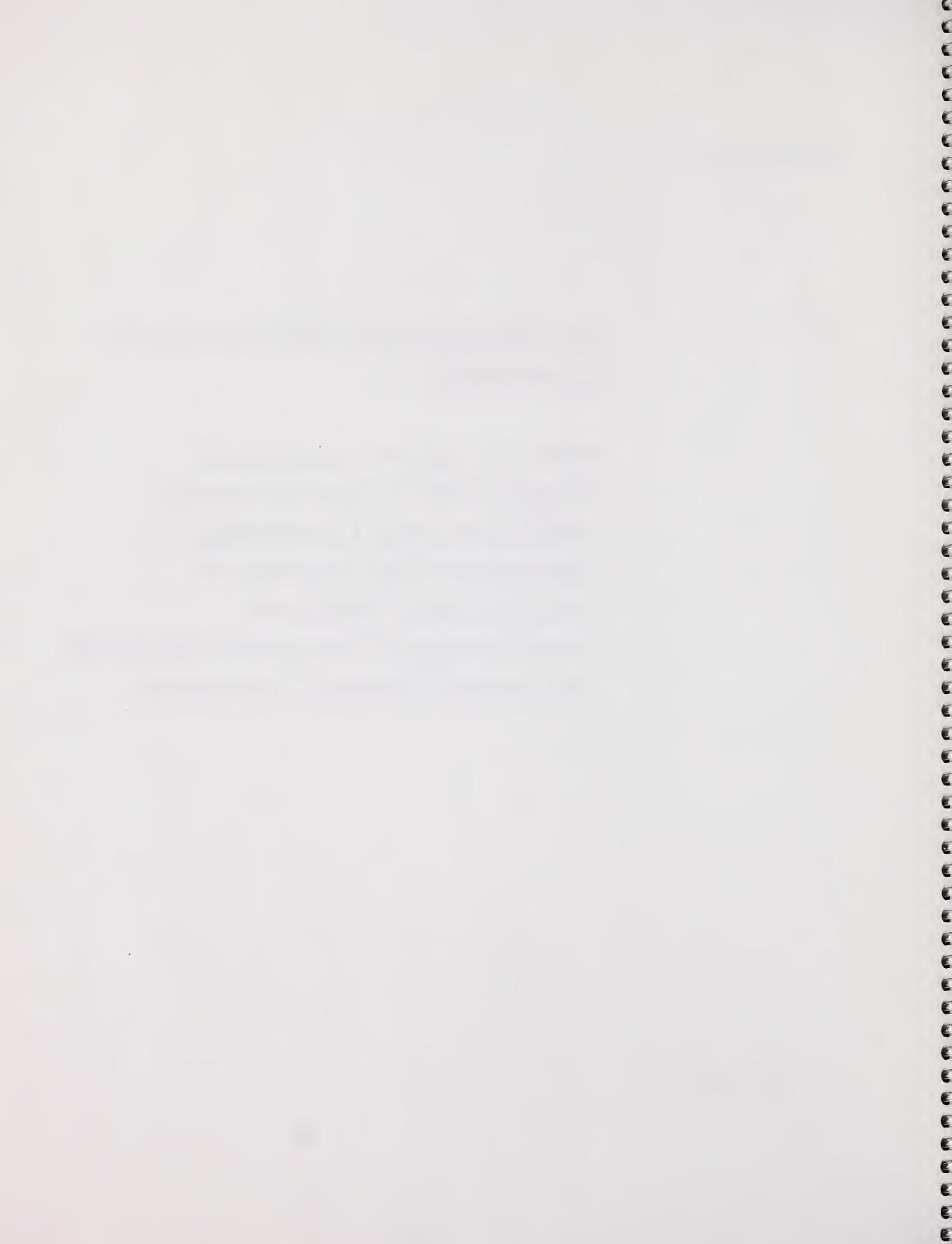
## Overview of the Assessment

The NCTM *Assessment Standards for School Mathematics (1995)* states that:

- multiple sources of assessment information should be used to evaluate student progress in mathematics
- there is a shift in the vision of learning mathematics toward investigating, formulating, representing, reasoning, and applying a variety of strategies to the solution of problems
- there is a shift in the role of teachers toward "questioning and listening" and away from "telling" students what to do
- there is a shift in the vision of evaluation toward a system based on evidence from multiple sources

In keeping with this vision, the assessment tasks in this package range from an end-of-course exam including selected-response questions and problem-solving, written-response questions, to tasks that are *performance-based*. The performance assessment provides students with an opportunity to demonstrate their understanding of the mathematical process more fully than they are able to on the end-of-course exam.

| Type of Assessment | Part/ Activity | Time | Mark Allocation | Total Marks |
|---|---|---|---|---|
| End-of-Course Exam | Selected Response<br>Written Response | <br>2 h | 36<br>20 | <br>56 |
| Performance Assessment | 3 contexts:<br><br>Best Buy for Soft Drinks<br>Budget for Car Expenses<br>Designing a Floor Plan | <br><br>1.5 h | <br><br>8<br>8<br>8 | <br><br>24 |
| TOTAL | | 3.5 h | | 80 |

## Components of the Assessment

The Mathematics 24 assessment consists of the following components:
- an end-of-course exam consisting of 36 selected-response and four written-response questions
- a performance assessment, which consists of three tasks, designed to be completed by students individually

## Definitions and Terminology

The Alberta Education *Course of Studies* for Mathematics 24 is defined by the learner expectations, what the student is expected to know and be able to do.

### Standard

A *standard* is a reference point used in planning and evaluation. A standard defines the quality of a performance, product, or service that is considered acceptable, or that is considered to be excellent.

In evaluating educational performance, the following forms of standards apply:

• *curriculum* and *assessments standards* apply to the assessment of individual students
• *achievement standards* apply to the assessment of student populations

In this document, only curriculum and assessment standards will be discussed.

### Curriculum Standard

A *curriculum standard* is a set of learner expectations for a module, course, or grade level of a program. The curriculum standards for Mathematics 24 are defined by the general learner expectations outlined on page 7 of the Course of Studies, and the specific learner expectations outlined on pages 16 to 26 of the Course of Studies.

### Learner Expectations

*General learner expectations* are concise statements identifying what it is that students are expected to know, be able to do, and be like upon completion of a module, course, or grade level of a program.

*Specific learner expectations* are the component knowledge, skills, and attitudes that contribute to general learner expectations. Specific learner expectations identify a range of contexts in which the general learner expectations apply.

### Assessment Standards

*Assessment standards* are the criteria used for judging individual student achievement relative to the curriculum standards and are noted in the assessment standard section of this document. Assessment standards have three components:

• *Criteria* are descriptors of student performance that indicate a standard has been met. Specific criteria may take on the form of task-specific criteria for a particular question or general scoring criteria used in assessing performance on a range of tasks.
• *Examples* are evidence of the quality of student work.
• *Guidelines for assessment and reporting* consist of information and advice for educators, to ensure consistency in assessment and reporting.

**Assessment Instrument**

An *assessment instrument* is a group of questions or tasks given to students to ascertain whether or not each has met the requirements of the acceptable standard or the standard of excellence.

**Blueprint**

A *blueprint* is a classification of the questions or tasks making up a particular assessment instrument. The classification may be in terms of question style (routine or non-routine), content sections (either topics or titles), or mathematical understandings (concepts, procedures, problem solving), or any other such classification.

**Scoring Criteria**

*Scoring criteria* consist of a set of descriptors of qualities of work for a particular extended-response question. These may later be converted to marks for reporting purposes.

**Mathematical Understandings**

The assessment of students' knowledge of *mathematical procedures* should provide evidence that they can:

- recognize when a procedure is appropriate
- give reasons for the steps in a procedure
- reliably and efficiently execute procedures
- verify the results of procedures empirically (e.g., using models) or analytically
- recognize correct and incorrect procedures
- generate new procedures and extend or modify familiar ones
- appreciate the nature and role of procedures in mathematics

The assessments of students' knowledge and understanding of *mathematical concepts* should provide evidence that they can:

- label, verbalize, and define concepts
- identify and generate examples and non-examples
- use models, diagrams, and symbols to represent concepts
- translate from one mode of representation to another
- recognize the various meanings and interpretations of concepts
- identify properties of a given concept and recognize conditions that determine a particular concept
- compare and contrast concepts

The assessments of students' ability to use mathematics in *solving problems* should provide evidence that they can:

- formulate problems
- apply a variety of strategies to solve problems
- solve problems
- verify and interpret results
- generalize solutions

(From *Curriculum and Evaluation Standards for School Mathematics*, National Council of Teachers of Mathematics, 1989, p. 209, 223, 228.)

# *Blueprint of the Assessment*

## *Conceptual*

| General Learner Expectations | End-of-Course Exam question numbers | Performance Assessment task numbers |
|---|---|---|
| *The student:* | | |
| • demonstrates that geometric shapes and solids have mathematical attributes | SR 7, 8 | |
| • shows that geometric shapes and solids can be measured directly and indirectly using various techniques, instruments and units, and that the accuracy of any measurement is dependent upon the instrument being used, the individual doing the measurement and the need for precision | SR 16, 19<br><br>WR 2 | 3 |
| • shows that pay received for work done can be calculated and that the deductions from gross pay can be determined | SR 15, 26, 34, 35, 36<br><br>WR 1 | |
| • understands that income tax will be paid by all workers and explains how the amount paid will depend upon a number of factors | SR 25, 27<br><br>WR 1 | |
| • shows how savings and chequing accounts with banks and other financial institutions are services that consumers can use to help manage their money | SR 9<br><br>WR 3 | |
| • shows that borrowing money is a consumer activity in which the use of someone else's money is bought and that the price is interest paid on the principal borrowed | SR 32 | |
| • explains that a mortgage is a loan used to purchase a residence | SR 32 | |
| • explains how household insurance is protection purchased from a company to cover losses incurred to a residence or its contents | | |
| • explains how life insurance is a way to provide financial protection for dependents in case of death | SR 28, 29, 30 | |

## *Procedural*

| General Learner Expectations | End-of-Course Exam question numbers | Performance Assessement task numbers |
|---|---|---|
| *The student:* | | |
| • uses skills in addition, subtraction, multiplication and division with whole numbers, integers and rational numbers to perform computations that can be done mentally, with paper and pencil, and with electronic calculators, as appropriate to a particular situation | SR 1, 2, 3, 4, 5, 6<br><br>WR 4 | |
| • shows that rounding, estimation and approximation are fundamental to facility in calculation | SR 18<br><br>WR 4 | |
| • checks an answer for reasonableness and accuracy, with the level of accuracy required dependent upon the particular situation | WR 2, 4 | |
| • estimates the approximate cost of building a new house from known measures and costs | SR 31 | . |
| • represents a residence by a scale drawing, which can then be measured and used for various purposes | SR 17 | 3 |
| • uses a personal budget to maintain records of expenditure and plan for the future | SR 11, 12, 13<br><br>WR 1 | |

## *Problem-Solving*

| General learner expectations | End-of-Course Exam question numbers | Performance Assessement task numbers |
|---|---|---|
| *The student:* <br><br> • explains how credit cards provide consumers with instant loans | | |
| • calculates and displays the costs associated with purchasing a motor vehicle | | 2 |
| • calculates and displays the costs associated with operating a vehicle | | 2 |
| • calculates and displays the costs associated with traveling | SR 10, 14, 20, 21, 22 | |
| • explains and gives examples of how consumers can obtain the best value for their money by the application of some wise spending practices | SR 23, 24 | 1 |

## Description of Standards

The *Course of Studies* for Mathematics 24 states that the content consists of topics required of all students who take the course. This required content contains the concepts, skills, and attitudes that all students are expected to acquire, as well as specific expectations for problem solving and the use of technology. For complete details of the Mathematics 24 course, refer to the *Course of Studies*.

The *Course of Studies* also states that "evaluation of students in the Senior High School Mathematics program will involve assessment of the level of achievement of **all of the learner expectations, including concepts, skills and attitudes, as well as problem-solving and technological expectations**."

The assessment standards for Mathematics 24 include an acceptable and an excellent level of performance. Students' performance should be measured on a range of tasks, some designed to focus on routine and obvious tasks in familiar contexts and others designed to focus on non-routine tasks in unfamiliar contexts.

### Acceptable Standard

The *acceptable standard* in Mathematics 24 would be obtained by students who receive a course mark between and including 50% and 79%. Typically, these students have gained new skills and a basic knowledge of the concepts and procedures relative to the general and specific learner expectations defined in the Mathematics 24 *Course of Studies*. These students can apply this knowledge to a limited range of familiar problem contexts. The *acceptable standard* identifies the degree to which learner expectations must be met for students to be successful in the demands placed in the context of on-the-job training for entry-level positions, or in the context of some of the apprenticeship trades.

### Standard of Excellence

The *standard of excellence* for Mathematics 24 would be obtained by students who receive a course mark at or above 80%. Typically, these students have gained a breadth and depth of knowledge of the concepts and procedures, and the ability to apply this knowledge to a broad range of familiar and unfamiliar problem contexts. This standard signifies high-quality performance relative to the general and specific learner expectations in the Mathematics 24 *Course of Studies*. The *standard of excellence* identifies the degree to which learner expectations must be met for students to excel in the demands placed in the context of on-the-job training for entry-level positions, or in the context of some of the apprenticeship trades. Students who meet the *standard of excellence* can also be expected to succeed in courses that require competencies similar to those expected in courses such as Mathematics 13.

**Students have reached the acceptable standard** if they are able to consistently complete acceptable work on routine and obvious tasks in familiar contexts.

**Students have reached the standard of excellence** if they are able to consistently complete excellent work on routine and obvious tasks in familiar contexts and acceptable work on non-routine tasks in unfamiliar contexts.

Details of the relationship of assessment standards to curricular learner expectations follow.

# Relationship of Assessment Standards to General Learner Expectations

## Mathematical Concepts

*Students relate numerical, geometric, and statistical concepts to model and solve simple mathematical problems.*

### Acceptable Standard

Students who meet the *acceptable standard* in Mathematics 24 have a **basic** understanding of the concepts outlined in the *Course of Studies*. They demonstrate their understanding in diagram and word forms, and can translate from one form to another. For example, students meeting the *acceptable standard*

- can show that workers who worked 150 hours at $9.50 per hour, and having 21% of their pay used for deductions, will have a take-home pay of $1 125.75

- construct a personal budget from detailed knowledge of monthly income, deductions from monthly income, fixed expenses, and discretionary expenses

To meet the *acceptable standard*, students communicate mathematical situations in an **understandable** way, using numbers, diagrams, and appropriate everyday and mathematical terms. They understand mathematical questions presented with objects, diagrams, or numbers in **familiar** contexts, and construct mathematical models by **translating words into suitable numbers.**

### Standard of Excellence

Students who meet the *standard of excellence* in Mathematics 24 have a **thorough** understanding of the concepts outlined in the *Course of Studies*. They demonstrate their understanding in diagram, word, and symbol forms, and can translate from one form to another. For example, students meeting the *standard of excellence*

- analyze a statement of earnings and deductions, and check each number for accuracy

- modify a personal budget to accommodate changed personal circumstances, such as moving away from home, getting married, or returning to school.

To meet the *standard of excellence,* students communicate about mathematical situations in a **clear** way, using numbers, diagrams, and the appropriate mathematical terms. They understand mathematical questions presented with objects, diagrams, or numbers **in familiar and unfamiliar contexts**, and construct mathematical models **by translating words into suitable numbers, diagrams, and tables.**

# Mathematical Procedures

*Students carry out single-step and multi-step procedures to obtain estimated and exact solutions to everyday mathematical problems.*

### Acceptable Standard

Students who meet the *acceptable standard* in Mathematics 24 have a fluency in carrying out the **most common** procedures outlined in the *Course of Studies*. For example, students meeting the *acceptable standard*

- calculate the closing balance of a chequing account by taking the opening balance, adding the total deposits, and subtracting the total of cheques, withdrawals, and bank charges

- determine that, given land costs of $2 700 per metre and construction cost of $725/ m$^2$, the cost of purchasing a 108 m$^2$ house on a 17 m lot is $124 200

- calculate the perimeter of a parallelogram whose sides are 11.6 cm and 21.9 cm is 67.0 cm

- estimate that the sum of $11.3 billion and $491 million is approximately $11.8 billion

Students meeting the *acceptable standard* perform the mathematical operations and procedures that are fundamental to daily living contexts.

### Standard of Excellence

Students who meet the *standard of excellence* in Mathematics 24 have a fluency in the **full range** of the procedures outlined in the *Course of Studies*. For example, students meeting the *standard of excellence*

- calculate a credit card closing balance, given an opening balance, purchases, payments on account, and interest charges, using current interest rates

- determine the minimum qualifying income for a 108 m$^2$ house on a 17 m lot where land costs are $2 700 per metre and construction costs are $725/m$^2$, using current interest rates and a 10% down-payment

- calculate the length of wallpaper, 90 cm wide, needed to cover an area of 7.65 m$^2$

- estimate the numerical value of $\dfrac{21.4}{14.2 \times (31.6 - 27.0)}$ and verify the estimate using a calculator

Students meeting the *standard of excellence* perform the mathematical operations and procedures that are fundamental to daily living contexts, and **provide alternative solution procedures to verify results.**

# Problem Solving

*Students solve consumer and everyday problems by using different mathematical procedures and strategies, employing both numerical and geometrical methods.*

### Acceptable Standard

Students who meet the *acceptable standard* in Mathematics 24 have a **basic** understanding of **some routine, problem-solving applications** of the required content outlined in the *Course of Studies*. For example, students meeting the *acceptable standard*

- show how the cost of gasoline for a journey depends on the distance travelled, the fuel economy of the vehicle, and the cost of 1 L of gasoline

- show that the cost of a $17.00 restaurant meal outside Alberta is approximately $22.00 after adding 13.5% tax and 15% tip

To meet the *acceptable standard*, students are expected to communicate mathematical situations in an **understandable** way, using numbers, diagrams, and appropriate everyday terms.

Students meeting the *acceptable standard* apply what they know in solving **straightforward problems in familiar settings** and in analyzing simple mathematical models. They describe the steps they used to solve a particular problem, and to defend their solution to the problem.

### Standard of Excellence

Students who meet the *standard of excellence* in Mathematics 24 have a **thorough** understanding of **both routine and non-routine problem-solving applications** of the required content outlined in the *Course of Studies*. For example, students meeting the *standard of excellence* can

- gather data to find the cost of operating a car for a year, and to display the data in bar and circle graph forms

- calculate the sales needed by a commission salesperson to earn a take-home income of $4 200 per month after expenses and deductions

To meet the *standard of excellence,* students communicate mathematical situations in a **clear** way, using numbers, diagrams, symbols, and any relevant mathematical terms.

Students meeting the *standard of excellence* apply what they know in solving **routine and non-routine problems in a broad range of settings**. They describe the steps they used to solve a particular problem, defend their solution to the problem, and, **where appropriate, provide alternative solution procedures to verify results.**
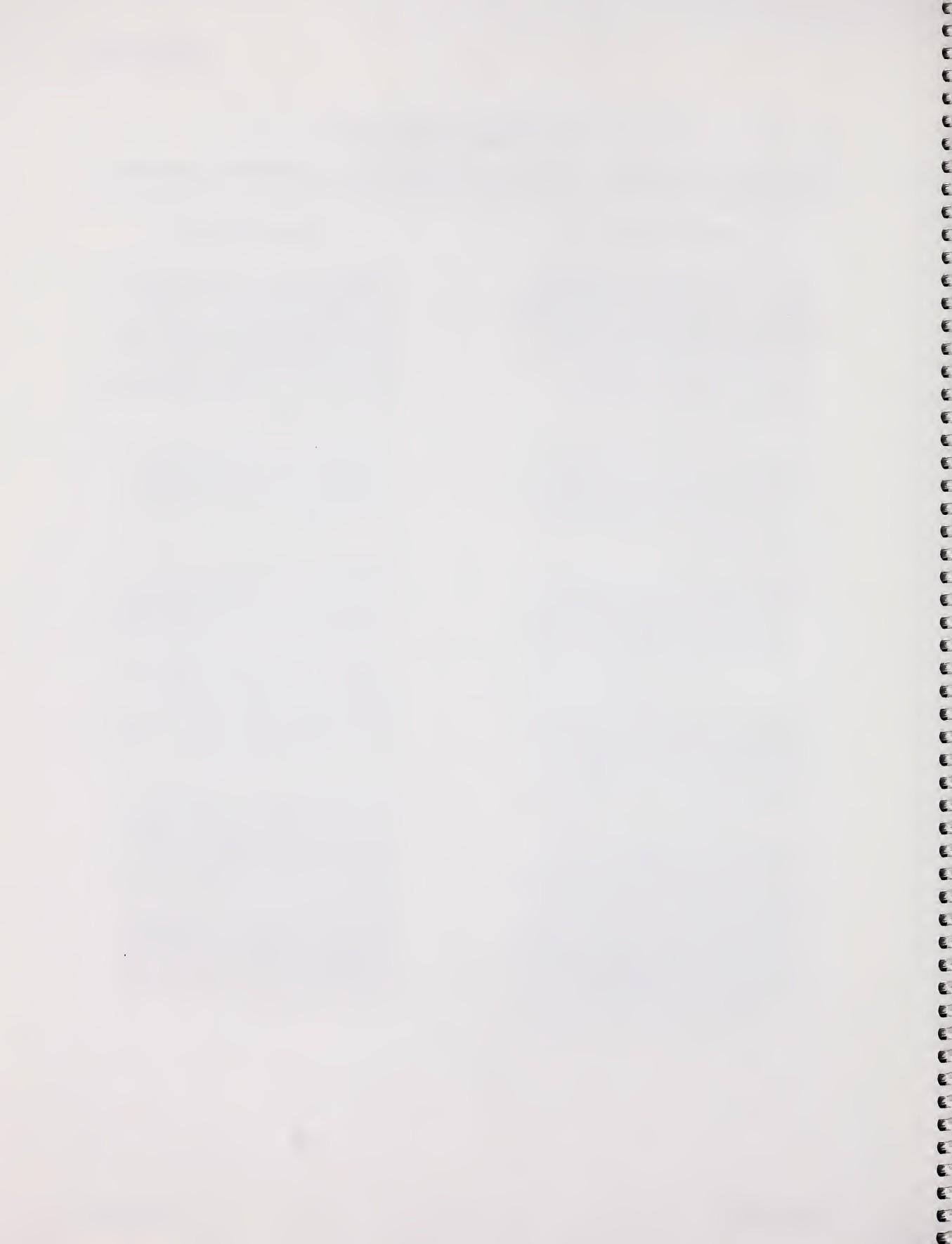
# *Administering and Scoring the Assessment Components*

- *General Scoring Criteria for Mathematical Content*
- *General Scoring Criteria for Communication Skills*
- *End-of-Course Exam*
- *Performance Assessment*
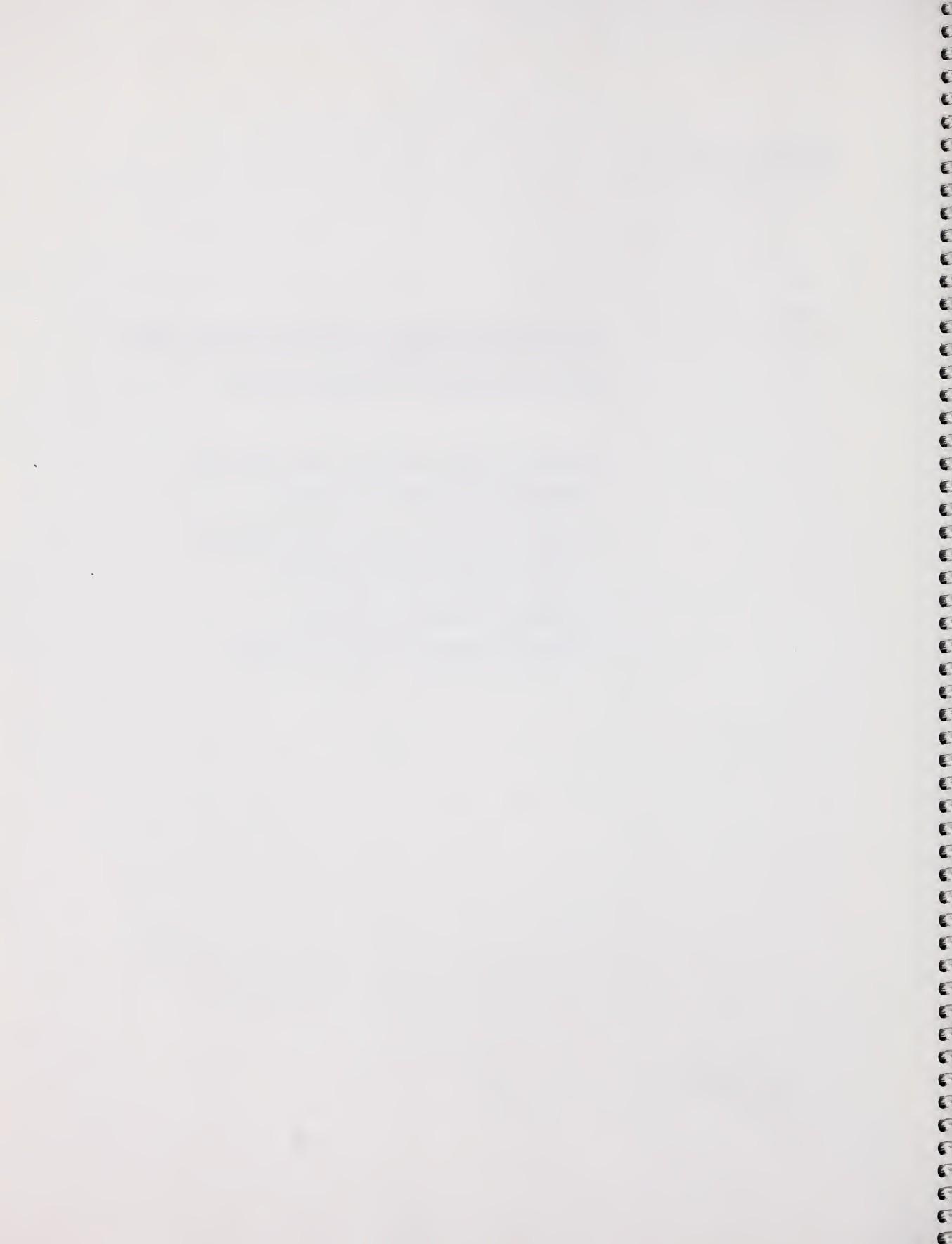
# General Scoring Criteria for Mathematical Content

These scoring criteria should be shared with students so that they are fully familiar with these criteria before they participate in the assessment. These criteria are used as a basis for the task-specific scoring criteria that are used to assess students' responses to particular extended-response items, whether written-response questions or performance tasks.

| Scale score | Criteria |
|:---:|:---|
| 5 | Complete answer, with supporting detail shown. Final answers are correct, and the communication is readily understandable. |
| 4 | Complete answer, but with minor errors present. Final answers may be incorrect, and the communication may lack some clarity. |
| 3 | **Either** a partial answer that is complete and correct as far as it goes, and represents a major step in the solution of the question; <br><br> **or** a complete answer that has one major error **or** many minor errors present but does indicate the full intended scope of the question. |
| 2 | **Either** a partial answer that is complete and correct (except for minor errors) as far as it goes, and represents a major step in the solution of the question; <br><br> **or** more than one correct answer, with no supporting detail; <br><br> **or** a complete answer that has one major error **and** many minor errors present, but does indicate either the full intended scope of the question or a strategy that could produce a complete response to the question. |
| 1 | **Either** one correct answer, with no supporting detail; <br><br> **or** a significant start made to the problem. |
| 0 | **Either** off-topic; <br><br> **or** an incorrect answer with no supporting detail; <br><br> **or** a fatal error present. Fatal errors, whether conceptual or procedural, are those errors that destroy the integrity of the original question, often making it completely trivial; <br><br> **or** a blank paper. |

# General Scoring Criteria for Communication Skills

These scoring criteria should be shared with students so that they are fully familiar with these criteria before they participate in the assessment. These scoring criteria are used as a basis for the task-specific scoring criteria that are used to assess students' responses to particular performance tasks.

The scores on this scale must be assigned **independently** of the scores on the mathematical content scale.

| Scale score | Criteria |
|:---:|---|
| 3 | A clear solution that includes all relevant elements, such as hypotheses, data tables, and graphs, shows the results of any computations in a systematic, ordered manner, and includes full concluding statements. The solution generally respects the normal conventions of mathematical communications in such matters as arrangement of data tables, axis labelling, graph drawing, and graph titling. Few, if any, gaps are left to be filled in by the reader. |
| 2 | A solution that includes some of the relevant elements, such as hypotheses, data tables, and graphs, shows the results of any computations in some manner, and includes some form of concluding statement. The solution makes an attempt to respect the normal conventions of mathematical communications in such matters as arrangement of data tables, axis labelling, graph drawing, and graph titling. Some gaps are left to be filled in by the reader. |
| 1 | A solution that may provide a data table, shows the results of any computations in a somewhat disorganized manner, and may not even include any form of concluding statement. The solution makes little attempt to respect the normal conventions of mathematical communications in such matters as arrangement of data tables, axis labelling, graph drawing, and graph titling. Large gaps are left to be filled in by the reader. |
| 0 | **Either** insufficient evidence of communication skills; **or** a numerical answer (correct or incorrect) with no supporting calculations; **or** a blank paper. |

# End-of-Course Exam

*Administration*    This requires two hours of class time and is a closed-book exam. Students are **not** given a formula sheet and must provide their own calculator. They are expected to work on their own.

## *Item Summary*

| ITEM # | MARK VALUE | ANSWER | QUESTION STYLE | ITEM # | MARK VALUE | ANSWER | QUESTION STYLE |
|---|---|---|---|---|---|---|---|
| SR 1 | 1 | C | basic | SR 19 | 1 | B | basic |
| 2 | 1 | C | basic | 20 | 1 | D | basic |
| 3 | 1 | D | basic | 21 | 1 | C | basic |
| 4 | 1 | C | basic | 22 | 1 | D | complex |
| 5 | 1 | D | basic | 23 | 1 | C | basic |
| 6 | 1 | A | basic | 24 | 1 | A | basic |
| 7 | 1 | C | basic | 25 | 1 | B | basic |
| 8 | 1 | A | basic | 26 | 1 | B | complex |
| 9 | 1 | A | basic | 27 | 1 | D | basic |
| 10 | 1 | A | complex | 28 | 1 | A | · basic |
| 11 | 1 | B | basic | 29 | 1 | D | complex |
| 12 | 1 | B | basic | 30 | 1 | B | basic |
| 13 | 1 | D | basic | 31 | 1 | A | basic |
| 14 | 1 | C | complex | 32 | 1 | B | complex |
| 15 | 1 | B | complex | 33 | 1 | B | complex |
| 16 | 1 | C | basic | 34 | 1 | A | basic |
| 17 | 1 | C | basic | 35 | 1 | D | basic |
| 18 | 1 | B | basic | 36 | 1 | C | basic |

| WR 1 | 5 | | 4 basic; 1 complex |
|---|---|---|---|
| 2 | 5 | | 3 basic; 2 complex |
| 3 | 5 | | 5 basic |
| 4 | 5 | | 2 basic; 3 complex |

*Continued*

*Mathematics 24 – Continued*

## By Question Type

| QUESTION TYPE | MARKS | PERCENT EMPHASIS |
|---|---|---|
| Selected Response | 36 | 64 |
| Written Response | 20 | 36 |

## By Question Style

| QUESTION STYLE | MARKS | PERCENT EMPHASIS |
|---|---|---|
| Basic or Routine | 42 | 75 |
| Complex or Non-Routine | 14 | 25 |

# *Written Response 1: Student Task and Solution*

**(5 marks)**      **1.** Janice graduated from school and found a job paying $11.75 per hour for 150 hours of work per month. She calculated that she had 18% of her salary deducted from her monthly paycheques.

**a.** Calculate Janice's gross income before deductions.

**Solution**

150 × $11.75 = **$1 762.50 before deductions**

**b.** Calculate Janice's monthly take-home pay.

**Solution**

Deductions are 18% of $1 762.50 or $317.25

Monthly take-home = gross – deductions = $1 762.50 – $317.25

**Monthly take-home pay is $1 445.25**

**c.** Janice has to pay off her five-year student loan at $214.50 per month. She wants to pay no more than one third of the rest of her paycheque for her rent. What is the **maximum** monthly rent that she can afford?

**Solution**

Student loan is taken off first, so $1 445.25 – $214.50 is left

This is $1 230.75, and so the maximum rent is one third of this, or $410.25.

**Janice can afford a maximum of $410 monthly for rent**

# Task-Specific Scoring Criteria for Written Response 1

| Scale score | Criteria |
|---|---|
| 5 | Complete answer, with supporting detail shown. Final answers are correct, and the communication is readily understandable. |
| 4 | Complete answer to all parts, but with minor procedural errors present in one of the three parts. Incorrect final answers must be reasonable, but the communication may lack some clarity. |
| 3 | **Either** a complete answer to all parts, but with minor procedural errors present in one or more of the three parts. Incorrect final answers may be unreasonable, and the communication may lack some clarity; <br><br> **or** a complete, correct answer to parts a. and b., with part c. started, but little progress made in part c. |
| 2 | **Either** correct answers to parts a. and b., with or without supporting detail shown, followed by a blank part c.; <br><br> **or** an answer showing a strategy that could be used to answer the full question, but that shows little accuracy in carrying out the strategy. |
| 1 | **Either** a correct answer to any single part, with or without supporting detail; <br><br> **or** an answer showing a significant step in the solution process, such as the relationship between gross and take-home pay, or the use of the one third factor for rent, or a similar sized step. |
| 0 | **Either** off-topic; <br><br> **or** an incorrect answer to a single part, with no supporting detail; <br><br> **or** a blank paper. |

# *Written Response 2:  Student Task and Solution*

**(5 marks)**   **2.**   The following table shows the kilometres between three major cities in Alberta.

| From/To | Grande Prairie | Fort McMurray | Edmonton |
|---|---|---|---|
| Grande Prairie | 0 | 720 | 460 |
| Fort McMurray | 720 | 0 | 445 |
| Edmonton | 460 | 445 | 0 |

The map of northern Alberta, with the three cities marked on it, is found below.



**Map of Northern Alberta**
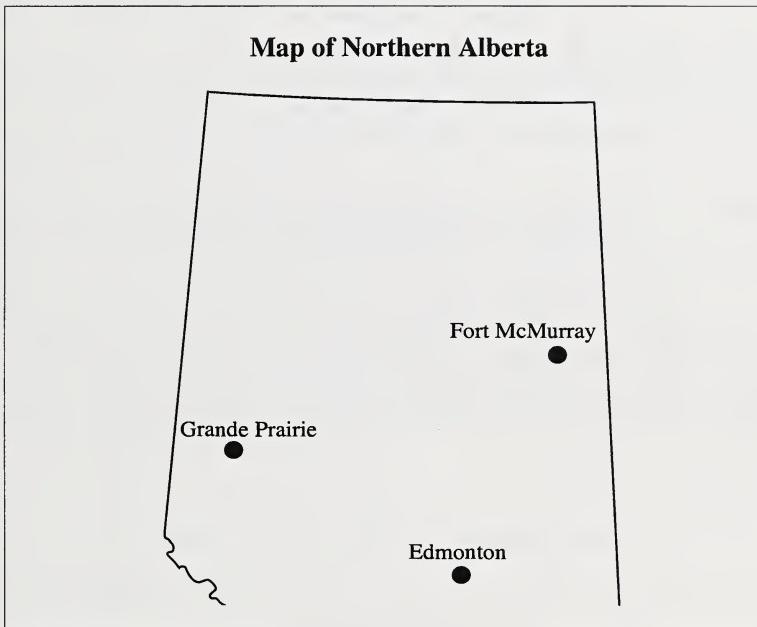
a.  How much **distance** is saved in travelling from Grande Prairie to Fort McMurray by the direct route, rather than going through Edmonton?

**Solution**

Direct route: 720 km

Via Edmonton: 460 km + 445 km = 905 km

Distance saved by direct route = 905 km – 720 km = **185 km**

**b.** If a car can average 90 km/h when travelling by the direct route, and average 100 km/h going through Edmonton, how much **time** is saved by travelling by the direct route?

**Solution**

Time on direct route = (720 km)/(90 km/h) = 8.00 h

Time via Edmonton = (905 km)/(100 km/h) = 9.05 h

Time saved = 9.05 h – 8.00 h = **1.05 h or 1 h 3 min or 63 min**

# Task-Specific Scoring Criteria for Written Response 2

| Scale score | Criteria |
|---|---|
| 5 | Complete answer to both parts, with supporting detail shown. Final answers are correct, and the communication is readily understandable. |
| 4 | Complete answer to both parts but with minor errors present. Final answers must be reasonable, but the communication may lack some clarity. Included in the minor errors is the use of the 100-minute hour for conversion from hours to minutes. |
| 3 | **Either** a complete and correct answer to part b., starting from an answer to part a. that shows no understanding of map reading; <br><br> **or** a complete answer to both parts, with procedural errors present. Final answers are sometimes unreasonable, and the communication lacks clarity. |
| 2 | **Either** a complete and correct answer to part a., with no effective work on part b.; <br><br> **or** an answer containing major procedural errors, but that shows a strategy that can be used to answer both parts of the question completely. |
| 1 | **Either** a correct answer to either part, with no supporting detail; <br><br> **or** a significant start made to the solution of the problem. Examples of significant starts include, but are not limited to, reading the distance chart, using the connections among speed, distance, and time, and recognizing the difference between direct and indirect distances between Grande Prairie and Fort McMurray. |
| 0 | **Either** off-topic, <br><br> **or** an incorrect answer to part a., with no supporting detail; <br><br> **or** a blank paper. |

# *Written Response 3: Student Task and Solution*

**(5 marks)**   **3.** Jorge is looking at his monthly bank statement. His opening balance at the beginning of the month was $725.90. He deposited two paycheques, each for $1 147.78, and one tax refund cheque for $561.20. He wrote 17 cheques, totalling $1 476.25, and made 9 bank machine withdrawals totalling $475.00.

   **a.** Before any service charges were taken out, what was Jorge's balance at the end of the month?

   **Solution**

   | | |
   |---|---|
   | Opening balance: | $725.90 |
   | Deposits: | $1 147.78 + $1 147.78 + $561.20 = $2 856.76 |
   | Withdrawals: | $1 476.25 + $475.00 = $1 951.25 |
   | Closing balance | = opening balance + deposits − withdrawals |
   | | = $725.90 + $2 856.76 − $1 951.25 |

   **Closing balance is $1 631.41 before service charges**

   **b.** The service charges are 60 cents for each cheque written and 35 cents for each bank machine withdrawal made. There are no service charges for deposits. How much did Jorge pay in service charges, and what was his final bank balance at the end of the month?

   **Solution**

   Service charges are $17 \times 0.60$ for the cheques and $9 \times 0.35$ for the bank machine withdrawals or $13.35 in total

   | | |
   |---|---|
   | Final bank balance | = closing balance − service charges |
   | | = $1 631.41 − $13.35, or $1 618.06 |

   **His final bank balance = $1 618.06**

# Task-Specific Scoring Criteria for Written Response 3

| Scale score | Criteria |
|---|---|
| 5 | Complete answer to both parts, with supporting detail shown. Final answers are correct, and the communication is readily understandable. |
| 4 | Complete answer to both parts, but with minor procedural errors present. Final answers may be incorrect, but must be reasonable, and the communication may lack some clarity. |
| 3 | **Either** an answer to part a. or part b. that is complete and correct, with supporting detail shown, and communicated in a readily understandable form; <br><br> **or** a complete answer to both parts of the question that has one major error or many minor errors present, but that shows an understanding of the relationship amoung opening and closing balances, the total deposits, the cheques and withdrawals, and the bank service charges. Final answers, if given, are often unreasonable. |
| 2 | **Either** an answer to part a. that is complete with supporting detail shown. Final answers may be incorrect, and the communication may lack some clarity; <br><br> **or** an answer to either part of the question that has one major error or many minor errors present, but that shows some understanding of the relationships among opening and closing balances, the total deposits, the cheques and withdrawals, and the bank service charges. Final answers, if given, are often unreasonable. <br><br> **or** a supported answer to part b. that follows from an unsupported part a. answer. |
| 1 | **Either** a correct answer to either part, with no supporting detail; <br><br> **or** a significant start made to the solution of the problem. Significant starts include, but are not limited to, adding deposits to the opening balance, subtracting withdrawals, cheques or bank charges from the opening balance, calculating the cheque charges or calculating the bank machine charges. |
| 0 | **Either** off-topic; <br><br> **or** an incorrect answer to any part, with no supporting detail; <br><br> **or** a blank paper. |

# *Written Response 4: Student Task and Solution*

**(5 marks)**    **4.** The calculation to be done is $\dfrac{21.6}{12.3 \times (14.5 - 7.9)}$.

   **a.** Use your calculator to find the result, and explain how you did this calculation on your calculator.

     Your explanation can be

     **either**
     a listing, in order, of the keystrokes used

     **or**
     an explanation of the reasoning used in doing the calculation.

     **Solution**

     1.   **Using a scientific calculator:**

        $21.6 \div (12.3 \times (14.5 - 7.9)) =$ giving a **final answer of 0.266075**

     2.   **Using a four-function calculator:**

        $14.5 - 7.9 = \times 12.3 = M+$, putting 81.18 into the memory

        $21.6 \div MR =$ , giving a **final answer of 0.266075**

   **b.** Estimate the result, and indicate using words, charts, or formulas how you did the estimate.

     **Solution**

     Numerator is about 22, while the denominator is about 84 (12 times 7)

     Final answer is about 0.25 (**friendly fraction 20/80 is close to 22/84**)

# Task-Specific Scoring Criteria for Written Response 4

| Scale score | Criteria |
|---|---|
| 5 | Complete answer to both parts, with supporting detail shown. Final answers are correct, and the communication is readily understandable. |
| 4 | Complete answer to both parts, but may have minor errors present. **Either** final answers may be incorrect, and the communication may lack some clarity; **or** final numerical answers to both parts are correct, but inadequately supported. |
| 3 | **Either** a complete answer that has one major error **or** many minor errors present, but that indicates the estimate, the calculation, the order of operations, and the written explanations in support; **or** final numerical answers to both parts are correct, but unsupported by any written explanation; **or** a correct numerical answer to part a. with full supporting detail but no valid estimation process shown in part b. |
| 2 | **Either** a reasonable estimate to part b., with supporting detail; **or** a correct numerical answer to part a., with no supporting detail in part a. and no estimate in part b.; **or** a complete answer that has one major error **or** many minor errors present, but that indicates some of the processes of estimation, calculation, selection of the order of operations, and includes some written explanations in support. |
| 1 | **Either** a reasonable estimate to part b., with no supporting detail; **or** a significant start made to the solution of the problem. Examples of significant starts include, but are not limited to, attempts at explaining estimates, and awareness of the order of operations in the calculation strategy used. |
| 0 | **Either** off-topic; **or** an unreasonable estimate in part b., with no supporting detail; **or** a blank paper. |

# Performance Assessment

## Administration

This requires 1.5 hours of class time and is a closed-book examination. Students are expected to work on their own.

The room should be set up with one station for every three students. Students need to be at the station for the data gathering in Task 1, but can do the calculations for Task 1 at their desks. They can do everything for Tasks 2 and 3 at their desks.

Students will need a ruler and a sharp pencil for the drawings needed in Tasks 2 and 3.

## Equipment needed (per station)

Measuring cylinder (100 mL or larger)....................................1
Small cup *A* (anywhere from 200 mL to 350 mL) ................1
Medium cup *B* (anywhere from 350 mL to 550 mL)............1
Large cup *C* (anywhere from 600 mL to 1100 mL)..............1
Water supply

The small cups do not have to be identical to each other; however, it makes marking this assessment easier if all the small cups are identical. The same applies to the medium cups and to the large cups. They can be purchased from many supermarkets, or obtained from soft drink outlets.

## Classroom management

At the start of the testing period, about one third of the class should be sent up to gather data for Task 1. One student is to be sent to each station. The other two thirds of the students should be directed to start the assessment with either Task 2 or Task 3.

The data gathering should take a maximum of five minutes. After the initial group of students has completed their data gathering, other students can go up to any vacant station when they are ready.

Students should clean up their stations after they have finished gathering their data for Task 1.

Except for unusual circumstances, students should do their own measuring and data gathering in Task 1.

# Task 1: Soft Drink Bargains
## Student Task and Solution

Ahmed had noticed that the prices of his favourite soft drink varied considerably, as did the sizes of the containers. He collected the following data on prices and sizes.

| Store name | Price for small pop | Price for medium pop | Price for large pop |
|---|---|---|---|
| Discount Joe | $0.85 per 350 mL | $1.29 per 550 mL | $1.69 per 900 mL |
| Luigi's | $0.79 per 300 mL | $1.09 per 500 mL | $1.29 per 750 mL |
| Taco Stand | $0.59 for cup $A$ | $1.19 for cup $B$ | $1.89 for cup $C$ |

**a.** Use a measuring cylinder to measure the volumes of each of the cups $A$, $B$, and $C$.

**Solution**

Cup $A$ (small) = **224 mL** ; cup B (medium) = **455 mL** ; cup $C$ (large) = **885 mL**

These were commercial (non-metric) 8, 16, and 32-ounce cups obtained from a supermarket. These cups will vary from place to place. Varying answers will cause the answers to part b. to vary.

**b.** Determine the best price for each size of drink (small, medium, and large). Show your calculations.

**Solution**

| Store Name | Price per litre for small pop | Price per litre for medium pop | Price per litre for large pop |
|---|---|---|---|
| Discount Joe | $0.85 per 350 mL or **$2.429/L** | $1.29 per 550 mL or $2.345/L | $1.69 per 900 mL or $1.878/L |
| Luigi's | $0.79 per 300 mL or $2.633/L | $1.09 per 500 mL or **$2.18/L** | $1.29 per 750 mL or **$1.72/L** |
| Taco Stand | $0.59 for cup $A$ or $0.59 per 224 mL or $2.634/L | $1.19 for cup $B$ or $1.19 per 455 mL or $2.615/L | $1.89 for cup $C$ or $1.89 per 885 mL or $2.136/L |

Best buys are **bolded**, with Discount Joe being the best buy for a small pop, and Luigi's being the best buys for medium and large pops.

# Task-Specific Scoring Criteria for Task 1

## Mathematical Content Scale

| Scale score | Criteria |
|---|---|
| 5 | A complete and correct solution based on unit prices or volumes per dollar, and including data obtained from the measured volumes of the three cups supplied. |
| 4 | **Either** a complete and correct solution for Diamond Joe's and Luigi's based on unit prices or volumes per dollar, including measurements of the three cups supplied, but not including the measured data in the calculations for Taco Stand; <br><br> **or** a complete solution, using measurements in part a. and unit prices or volumes per dollar in part b., with the solution showing some inaccuracies in measurement or calculation. |
| 3 | **Either** a complete and correct solution for Diamond Joe's and Luigi's based on unit prices or volumes per dollar, but not including any measurements of the three cups supplied; <br><br> **or** a complete solution, using measurements in part a. and unit prices or volumes per dollar in part b., with the solution showing many inaccuracies in measurement and calculation; <br><br> **or** a complete set of measurements in part a., together with the calculation of at least one row or column of unit prices in part b. |
| 2 | **Either** a complete set of measurements in part a., with little progress in part b.; <br><br> **or** a complete set of calculations for the three unit prices or three volumes per dollar for a row or a column in part b. |
| 1 | A significant start made to the problem, such as the measurement of the volume of one cup in part a., or the calculation of one unit price or volume per dollar in part b. |
| 0 | **Either** off-topic; <br><br> **or** a blank paper. |

*Continued*

# Communication Skills Scale

This scale is used **independently** of the *Mathematical Content* scale. A well-laid-out, systematic strategy with conclusions clearly stated can receive a scale score of 3, even if the comparison itself is based on data that contain gross errors in the calculations of the supporting numbers.

| Scale score | Criteria |
|---|---|
| 3 | A clear solution that states explicitly the basis for comparison (either dollars per litre or millilitres per dollar), shows the results of computation in a systematic, ordered manner, and includes a full concluding statement. Few, if any, gaps are left for the reader to fill in. |
| 2 | A solution that states, by implication, the basis for comparison (either dollars per litre or millilitres per dollar), shows the results of computation in a relatively systematic manner, and may not include a full concluding statement. Some gaps are left for the reader to fill in, but the comparison methodology can be discerned. |
| 1 | An attempt has been made to communicate the comparison strategy, but nothing systematic is stated or implied. Calculations, when done, are arranged randomly, and the comparison methodology is not evident. |
| 0 | **Either** insufficient evidence of communication skills; **or** a blank paper. |

# Task 2: Operating a Car for a Year
## Student Task and Solution

Roger kept good records of the costs of running his 1993 compact car for the calendar year 1995. He found the following costs:

| Cost category | Costs incurred |
| --- | --- |
| Depreciation | $2 650.00 |
| Insurance and registration | $840.00 |
| Tires | 4 at $72.50 each |
| Oil changes | 7 at $32.95 each |
| Gasoline | 3 100 L at 44.9 cents/litre |
| Repairs | $115.00 for a tune-up<br>$277.50 for brakes |
| Parking | $44.50 per month for 12 months |
| Washing | 27 washes at $4.25 each |
| Interest on borrowed money | $1 145.00 |

**a.** What was the total cost, to Roger, of running his car for the year?

**Solution**

$2 650 + $840 + (4 × $72.50) + (7 × $32.95) + (3 100 × $0.449) + $115
+ $277.50 + (12 × $44.50) + (27 × $4.25) + $1 145 = **$7 588.80**

**Roger's total cost = $7 588.80 for the year**

**b.** If the price of gasoline increased to 61.5 cents/litre, how much extra would it cost Roger to run his car for the year?

**Solution**

3 100 × ($0.615 − $0.449) = **$514.60 extra per year**

**c.** Display the budget as a graph.

**Solution**

### Cost of Running Car, by Category
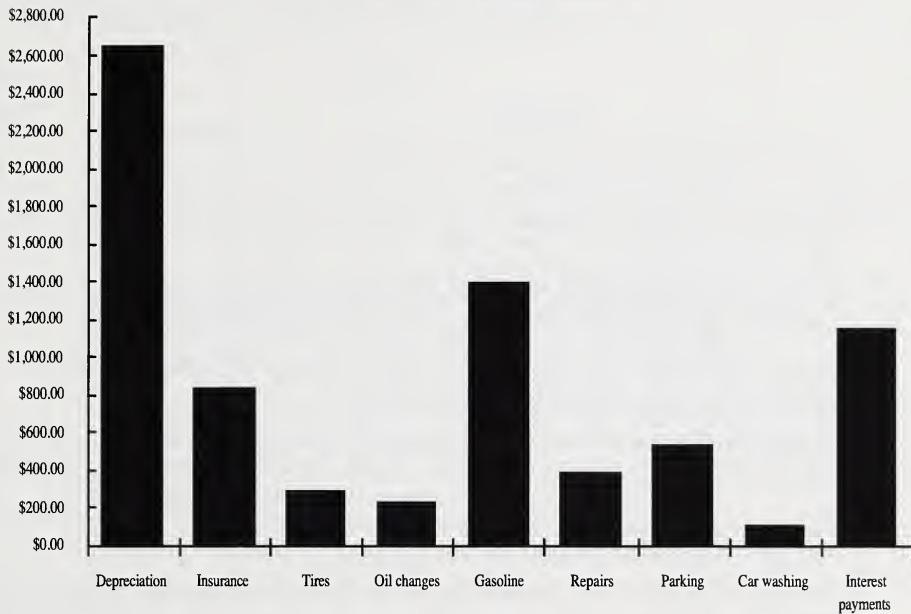
# Task-Specific Scoring Criteria for Task 2

## Mathematical Content Scale

| Scale score | Criteria |
|:---:|---|
| 5 | Complete and correct set of answers to parts a. and b., together with a bar graph in part c. that accurately represents these answers. |
| 4 | **Either** a complete and correct set of answers to parts a. and b., together with a bar graph in part c. that reasonably represents these answers; <br><br>**or** a reasonable set of answers to the numerical calculations in parts a. and b., together with a bar graph in part c. that exactly represents these answers. |
| 3 | **Either** a complete and correct set of answers to parts a. and b., with little significant progress on the bar graph in part c.; <br><br>**or** a reasonable set of answers to the numerical calculations in parts a. and b., together with a bar graph in part c. that approximately represents these answers. |
| 2 | **Either** a reasonable set of answers to the numerical calculations in parts a. and b., with little significant progress on the bar graph in part c.; <br><br>**or** an unreasonable set of answers to the numerical calculations in parts a. and b., together with a bar graph in part c. that approximately represents these answers. |
| 1 | A significant start to the solution of the problem. Examples of significant starts include, but are not limited to, showing a totalling process in part a., multiplying a difference in gasoline prices by 3 100 in part b., and displaying a set of numbers of dollars in a bar graph form. |
| 0 | **Either** off-topic; <br><br>**or** a blank paper. |

*Continued*

# Communication Skills Scale

This scale is used **independently** of the *Mathematical Content* scale. A well-drawn, fully labelled graph can receive a scale score of 3, even if the graph itself is based on data that contain gross errors in the calculations of the supporting numbers.

| Scale score | Criteria |
|---|---|
| 3 | A budget graph that is clearly drawn and fully labelled. There is evidence that the reader has been taken into account, and that the conventions of graph drawing, axis labelling, and computation of the numbers have been generally respected. |
| 2 | A budget graph that is drawn and labelled. Drawings may lack clarity and may be missing some labelling. There is some evidence that the reader has been taken into account. Conventions of graph drawing, axis labelling, and computation of the numbers have been respected only on an inconsistent basis. |
| 1 | An attempt has been made to communicate the budget, but the communication requires the reader to fill in many gaps in the drawing of the columns, the labelling of the axes, and the computation of the numbers. Generally difficult for the reader to understand. |
| 0 | **Either** insufficient evidence of communication skills; **or** a blank paper. |

# Task 3: House Floor Plans
## Student Task and Solution

You have won $200 000 in a lottery and decide to build a house. Because your grandfather will be coming to live with you, you decide to build a house on one level. The city council does not allow any basements, so there are no stairs in the house at all. There must be sufficient hallways and passages to allow for the easy movement of people through the house.

Make your house plan with main floor rooms of the following areas:

| Room or area on main floor | Total area in square metres |
|---|---|
| Kitchen/dining room | 36 |
| Living/family room | 72 |
| 2 bathrooms | 15 in total |
| 3 bedrooms | 80 in total |
| Two-car garage | 42 |
| Hallways and passages | sufficient for easy movement of people |

**a.** What would be reasonable for the length and the width of the two- car garage?

**Solution**

**7 m by 6 m. Other than 6 m by 7 m, there are few others that involve whole numbers of metres for length and width**

**b.** What could be reasonable for the length and the width of each of the three bedrooms, given that the bedrooms can be of different sizes and shapes?

**Solution**

**One possibility would be 8 m by 5 m for the master bedroom, and 5 m by 4 m for each of the other two bedrooms.**

Here the number of possibilities is enormous, even including the convenient restriction of whole numbers for length and width.

**c.** Draw an accurate house plan, using either one of the grids on the next two pages. Use a scale of 1 unit = 1 m in your plan. Your plan, which must be to scale, **must** include all doors and hallways, and provide **at least two** entrances to the house, one from the front and one through the garage. The garage **must** be attached to the house.

**Note:** The scale of 1 square = 1 m used in the pilot has been changed to 1 unit = 1 m.

**Solution**

## Grid Scale  1 unit = 1 m



Bedroom #3

Kitchen/dining room

door

Deck

door          door      door

door          door

Bathroom #2  door

Bedroom #2

Living/family room

door

Bathroom #1

Central hall
and passageway      door

door

door

Master Bedroom

door

Garage

front door
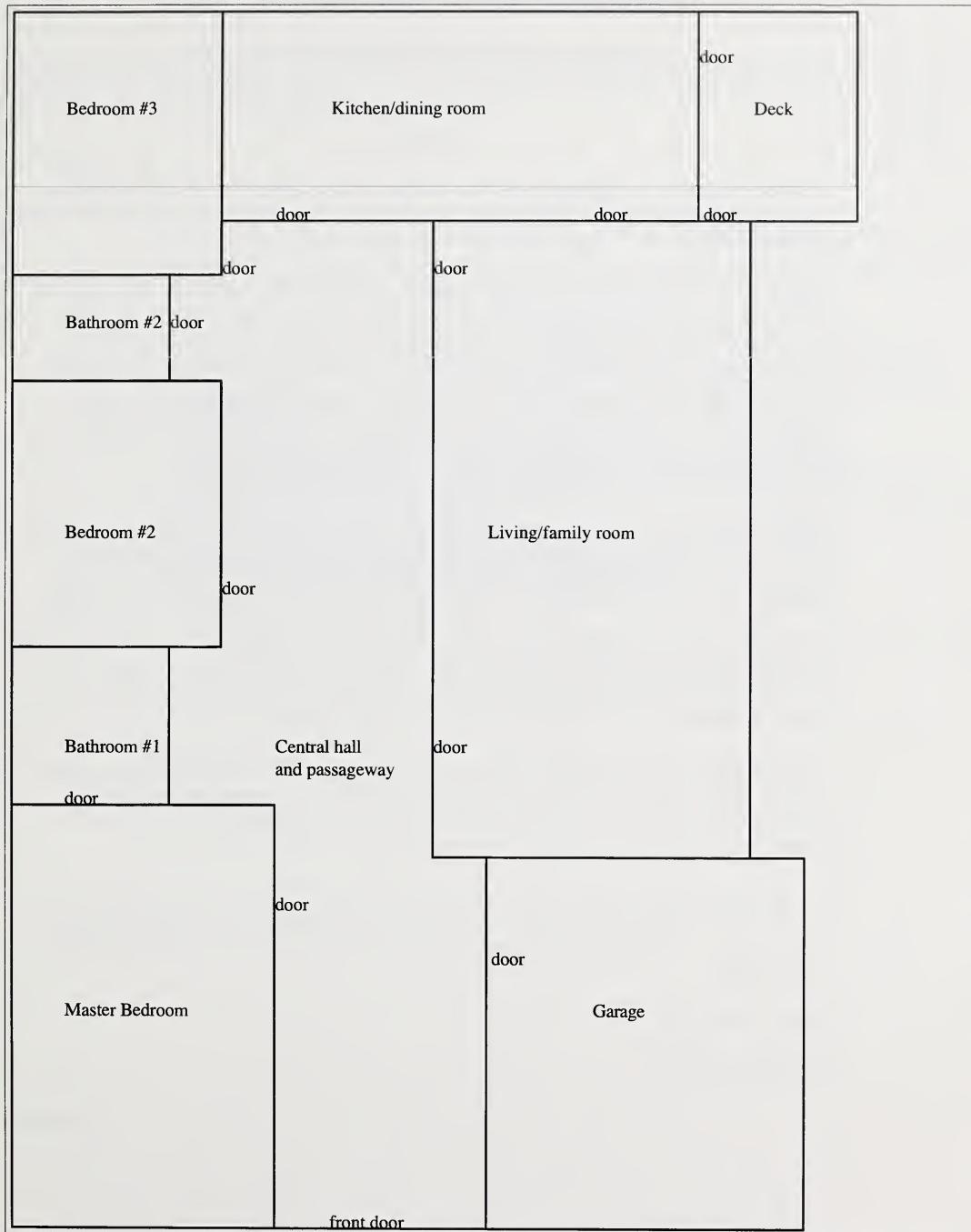
# Task-Specific Scoring Criteria for Task 3

## Mathematical Content Scale

| Scale score | Criteria |
|---|---|
| 5 | A house plan that incorporates **all** the design criteria asked for in the table, together with appropriate supporting calculations. The design should not have any obvious flaws. |
| 4 | **Either** a house plan that incorporates **most** of the design criteria asked for in the table, together with appropriate supporting calculations. The design should not have any obvious flaws, such as a garage that cannot fit two cars, insufficient hallway space, bathrooms that are attached to the garage, or other similar flaws; <br><br>**or** a house plan that incorporates **all** the design criteria asked for in the table, together with appropriate supporting calculations. The design may have one obvious flaw, such as a garage that cannot fit two cars, insufficient hallway space, bathrooms that are attached to the garage, or other similar flaws. |
| 3 | **Either** a house plan that incorporates **some** of the design criteria asked for in the table, together with appropriate supporting calculations. The design should not have any obvious flaws, such as a garage that cannot fit two cars, insufficient hallway space, bathrooms that are attached to the garage, or other similar flaws; <br><br>**or** a house plan that incorporates **most** of the design criteria asked for in the table, together with appropriate supporting calculations. The design may have one or two obvious flaws, such as a garage that cannot fit two cars, insufficient hallway space, bathrooms that are attached to the garage, or other similar flaws. |
| 2 | A house plan that incorporates **some** of the design criteria asked for in the table, with or without appropriate supporting calculations. The design may have some obvious flaws, such as a garage that cannot fit two cars, insufficient hallway space, bathrooms that are attached to the garage, or other similar flaws. |
| 1 | A significant start on the problem. Examples of significant starts include, but are not limited to, determining the dimensions of one or more rooms, placing one or more rooms on the house plan, and attaching the garage to the outside perimeter of the house. |
| 0 | **Either** off-topic; <br>**or** a blank paper. |

# Communication Skills Scale

This scale is used **independently** of the *Mathematical Content* scale. A well-drawn, fully labelled drawing can receive a scale score of 3, even if the design itself has major flaws, such as a garage that is 21 m by 2 m and not attached to the house.

| Scale score | Criteria |
|---|---|
| 3 | A house design plan that is clearly drawn and fully labelled. There is evidence that the reader has been taken into account, and that the conventions of scale drawing have been generally respected. |
| 2 | A house design plan that is drawn and labelled. Drawings may lack clarity and may be missing some labelling. There is little evidence that the reader has been taken into account. Conventions of scale drawing have been respected only on an inconsistent basis. |
| 1 | An attempt has been made to communicate the design, but the communication requires the reader to fill in many gaps in the drawing and the labelling. Generally difficult for the reader to understand. |
| 0 | **Either** insufficient evidence of communication skills; <br> **or** a blank paper. |
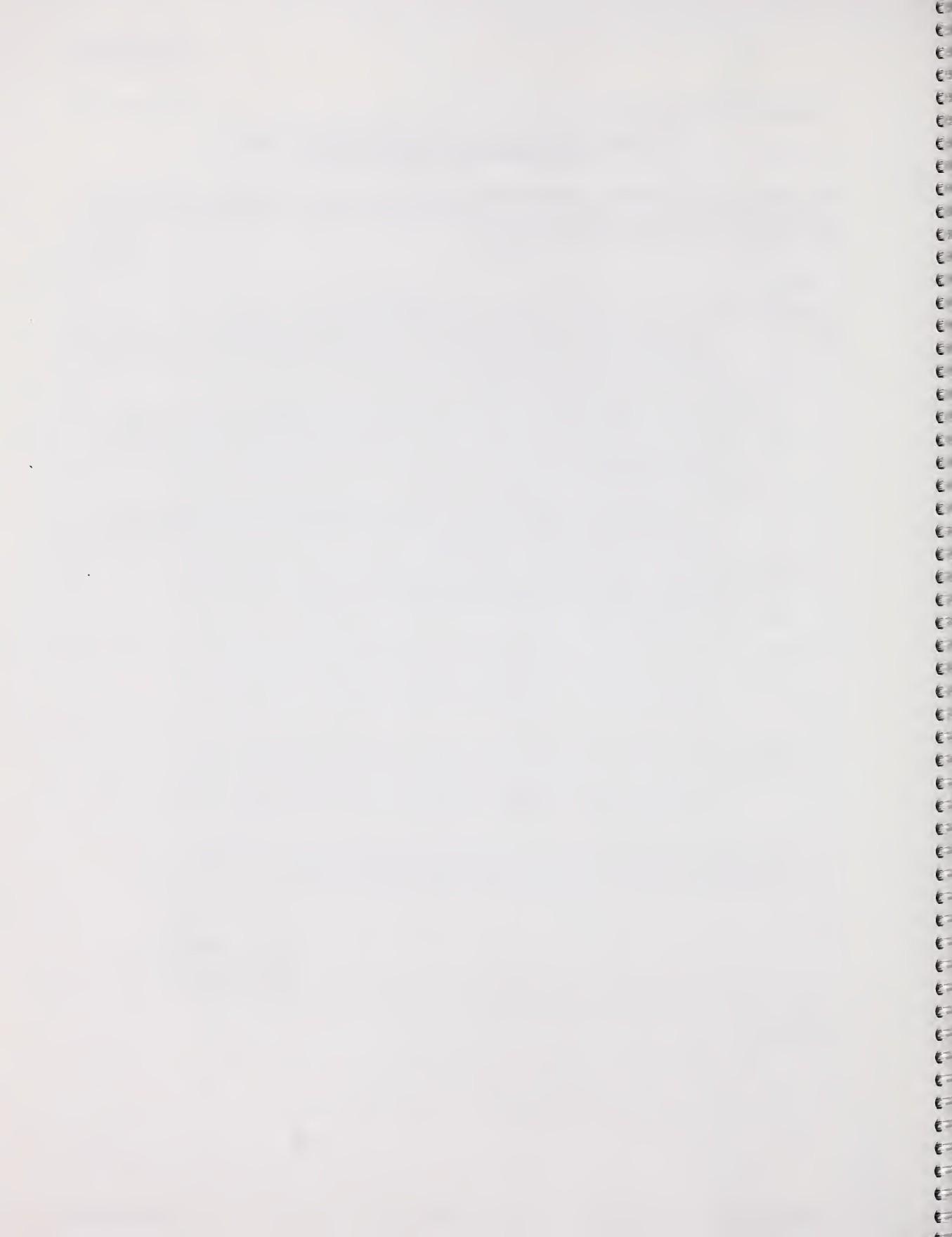
# Calculating and Recording Student Achievement

- **Standards for Overall Performance on the Assessment**
- **Class Record Form**
- **Item Summary — Overall Assessment**
- **Directing Words**
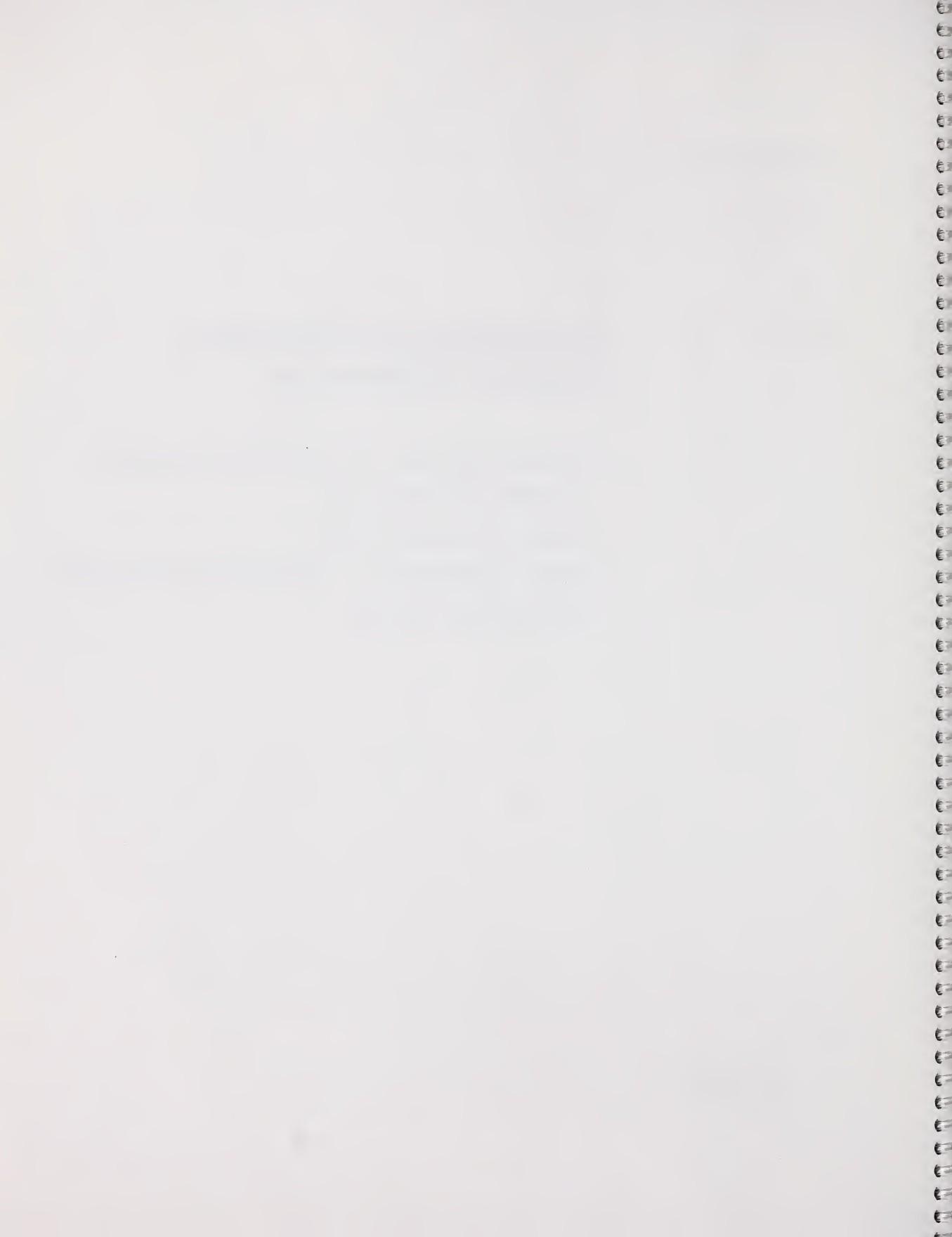
# *Standard for Overall Performance on the Assessment*

Scoring criteria for each component of the assessment are provided in the teacher intructions for each component. Assessment standards for the overall performance of a student on the whole package are as follows:

| Not Yet at Acceptable Standard (NS) | Acceptable Standard (AC) | Standard of Excellence (EX) |
|---|---|---|
| 0-49% on the total score | 50% - 79% on the total score | 80% - 100% on the total score |

Standards for the assessment were established and validated using the scoring criteria outlined for each task. If the tasks are scored using different criteria or used for purposes other that assessing achievement at the end of Mathematics 24, these standards may not be appropriate.

The standards for performance on the assessment apply to all students. Professional judgement should be used to make adjustments to administration procedures so that special needs students are able to demonstrate their best work.

CLASSROOM
ASSESSMENT
MATERIALS

# *Class Record Form*

| Student Name | A<br>End-of-Course Exam<br>(56) | B<br>Performance Assessment<br>(24) | A + B<br>Overall weighted achievement<br>(80) | A + B (%)<br>Overall percentage weighted achievement<br>$\frac{A + B}{80} \times 100\%$ | Standard* |
|---|---|---|---|---|---|
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\* The standards for this assessment package are as follows.

| Not Yet at Acceptable Standard (NS) | Acceptable Standard (AC) | Standard of Excellence (EX) |
|---|---|---|
| 0-49%<br>on the total score | 50% - 79%<br>on the total score | 80% - 100%<br>on the total score |

# *Item Summary – Overall Assessment*

## By Question Type

| QUESTION TYPE | MARKS | PERCENT EMPHASIS |
|---|---|---|
| Selected Response | 36 | 45 |
| Written Response | 20 | 25 |
| Performance-Based | 24 | 30 |

## By Question Style

| QUESTION STYLE | MARKS | PERCENT EMPHASIS |
|---|---|---|
| Basic or Routine | 56 | 70 |
| Complex or Non-Routine | 24 | 30 |

# *Directing Words*

## Discuss
The word "discuss" will not be used as a directing word on mathematics classroom assessments because it is not used consistently to mean a single activity.

### *The following words are specific in meaning:*

## Contrast/Distinguish
Point out the *differences* between two things that have similar or comparable natures.

## Compare
Show the character or relative values of two things by pointing out their similarities and differences.

## Conclude
State a logical end based on reasoning and/or evidence.

## Criticize
Point out the merits and demerits of an item or issue.

## Define
Provide the essential qualities or meaning of a word or concept. Make distinct and clear by marking out the limits.

## Describe
Give a written account or represent the characteristics of something by a figure, model, or picture.

## Design/Plan
Construct a plan; i.e., a detailed sequence of actions for a specific purpose.

## Enumerate
Specify one by one or list in concise form and according to some order.

## Evaluate
Give the significance or worth of something by identifying the good and bad points or the advantages and disadvantages.

## Explain
Make clear what is not immediately obvious or entirely known; give the cause of or reason for; make known in detail.

## How
Show in what manner or way, and with what meaning.

## Hypothesize
Form a tentative proposition intended as a possible explanation for an observed phenomenon; i.e., a possible cause for a specific effect. The proposition should be testable logically and/or empirically.

## Identify
Recognize and select as having the characteristics of something.

**Illustrate**
Make clear by giving an example. The form of the example must be specified in the question; i.e., word description, sketch, or diagram.

**Infer**
Form a generalization from sample data; arrive at a conclusion by reasoning from evidence.

**Interpret**
Tell the meaning of something; present information in a new form that adds meaning to the original data.

**Justify/Show How**
Show reasons for or give facts that support a position.

**Outline**
Give, in an organized fashion, the essential parts of something. The form of the outline must be specified in the question; i.e., lists, flow charts, concept maps.

**Predict**
Tell in advance on the basis of empirical evidence and/or logic.

**Prove**
Establish the truth, validity, or genuineness of something by giving formal logical reasons.

**Relate**
Show logical or causal connection between things.

**Show**
Establish the truth, validity, or genuineness of something by giving reasons. The format of the demonstration can take various forms, from algebraic derivations and formal logic to geometrical and numerical examples.

**Solve**
Give a solution for a problem; i.e., explanation in words and/or numbers.

**Summarize**
Give a brief account of the main points.

**Trace**
Give a step-by-step description of the development.

**Why**
Show the cause, reason, or purpose.